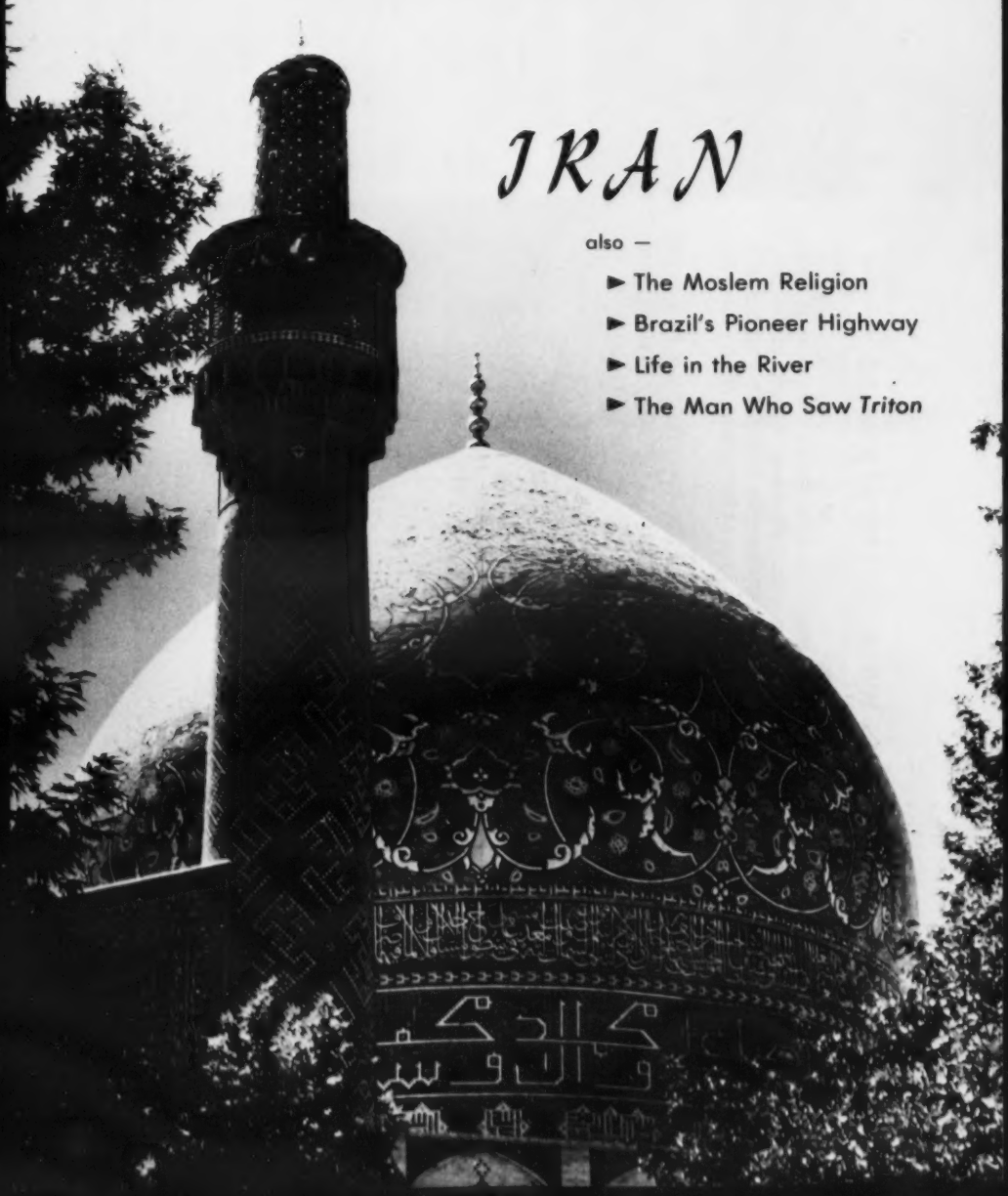
GEOGRAPHIC SCHOOL BULLETINS

THE NATIONAL GEOGRAPHIC SOCIETY, WASHINGTON 6, D.C.

JANUARY 30, 1961, VOLUME 39, NUMBER 16 . . . *To Know This World, Its Life*



IRAN

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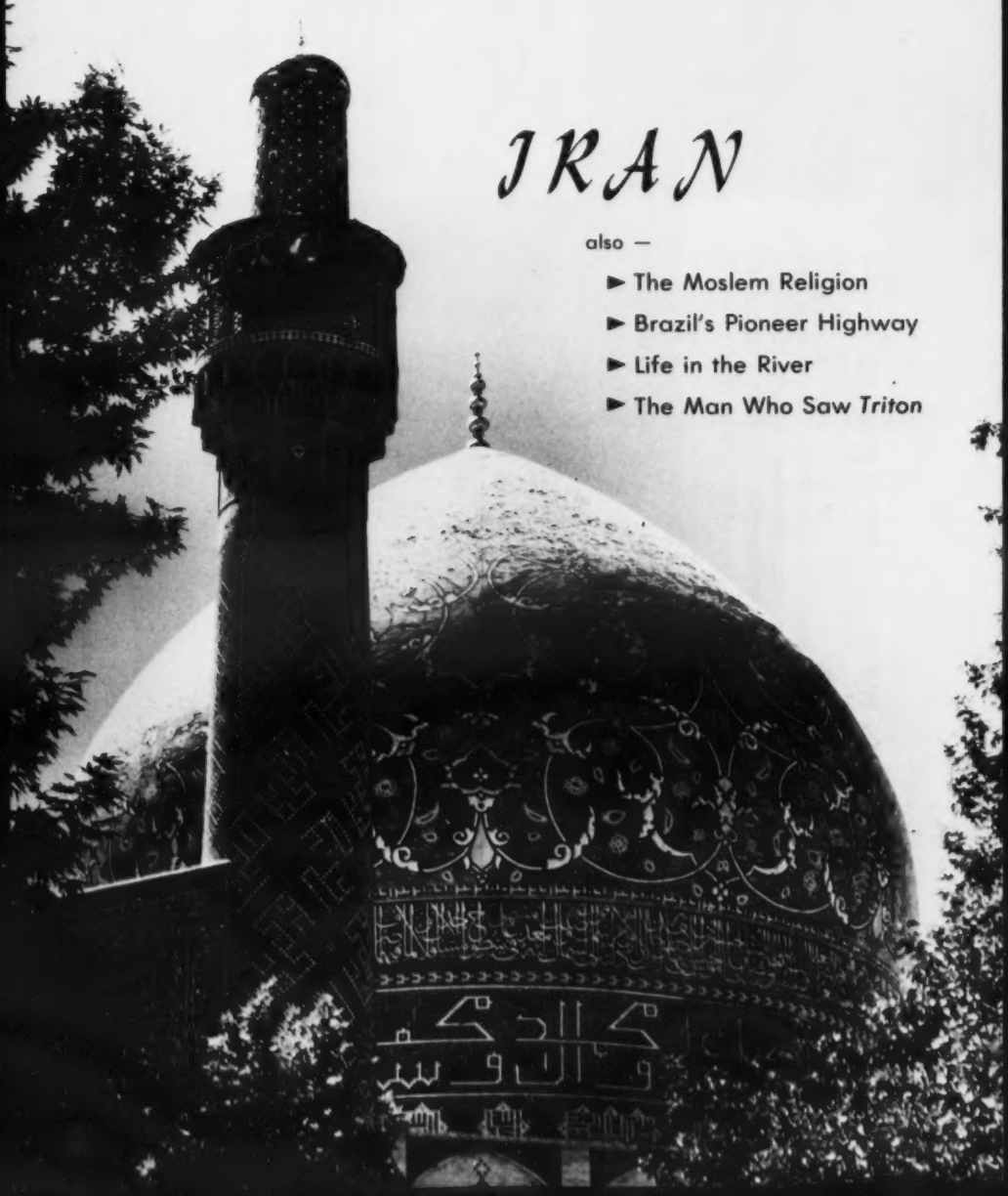

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IRAN Oil helps water a thirsty land

BENEATH MOUNT DAMAVAND, striped by a single cloud in the late afternoon sun, Iranian shepherds drive home their sheep and goats, still hungry after a day of nibbling thistle and thornbush on the rocky slopes.

Although today mention of Iran brings mental pictures of fabulous oil riches, many Iranians live as their distant ancestors did, plodding behind oxen-pulled plows, churning butter by rocking milk-filled goatskins slung from wooden tripods.

In Iran the centuries seem to overlap. Camel caravans trudge past grain elevators and Moslem women garbed in the tent-like *chador* window-shop for Paris styles in Tehrān.

THOMAS J. ABERCROMBIE, NATIONAL GEOGRAPHIC STAFF. COVER, MERCEDES H. DOUGLAS

Reflections of two 300-year-old mosques shimmer in a pool at Eşfahān, above. Their builders would be at home today in Eşfahān's bazaar. "Bespectacled silversmiths still tap out their delicate scrollwork," writes Edward J. Linehan in the January 1961 *National Geographic*. "Coppersmiths shape trays and bowls and pitchers with clanging hammers; woodworkers turn pipe

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bowls on bowstring lathes, guiding chisels with fingers and toes; artists thump carved wooden blocks on unbleached cotton, producing exotic printed *Ghalamkar* fabrics." Blacksmiths hammer out shoes for donkeys. Camels, walking a circle, turn an antiquated cottonseed oil press. Men make nails by hand.

Still, things are getting done in Eşfahān. Wage increases and new homes for textile workers are no longer dreams, but realities. Telephones link many homes. Hospitals, motels, a modern water system, and a cooperative supermarket are on the way.

Iran is big—636,000 square miles—but, with 21,281,000 persons, thinly populated. It would cover France three times, but has less than half France's population.

Most of Iran lies on a 4,000-foot central plateau framed by spectacular mountains, lovely to look at but difficult to live with for they bar the life-giving wet winds off the Mediterranean. Although fertile, the plateau is discouragingly dry. In the south and east lie two vast salt-caked deserts unfit for life. The temperatures on this plateau are uncomfortably extreme: baking hot in summer and bitter cold in winter.

Big as it is, Iran is small by its own standards. Twenty-five hundred years ago it was called Persia (its name, given by the

Persian rugmaking is Iran's best-known craft. A child's agile fingers fly over a loom (right) in a Kermān factory. Children as young as nine work in these mills. Their average wage: 50 cents a day. A good carpet takes months, sometimes years to weave. Below at Chashmeh-Ye 'Alī near Rey, a Tehrān suburb, dozens of carpets are laid face down to dry on the rocky hillside after having been washed in a pool of clear spring water.

ROBERT E. GILKA, RIGHT, THOMAS J. ABERCROMBIE, NATIONAL GEOGRAPHIC STAFF

UMI

Greeks, derived from the southern province of Pars), and its empire stretched from Egypt to India.

Roads, one of them 1,500 miles long, linked each of its 20 provinces. The Persians claim the oldest regular postal system in the world and a secret police organization known as "The Eyes and Ears of the King" that kept tabs on the most distant provincial governors. Dams and extensive irrigation systems watered rich fields of sugar cane and groves of oranges.

But in 333 B.C. the armies of Alexander the Great of Macedonia overran the empire, the first in a series of foreign invasions. For more than 2,000 years, Persia enjoyed only brief periods of independence. In the 7th century A.D. the Arabs came, bringing their Islamic faith, and Iran today remains about 98 percent Moslem (see page 186). Turks, Mongols, Tartars, and Afghans conquered Iran. In this century Great Britain and Russia coveted the country, but neither succeeded in taking all of it. For a time it was divided between them in spheres of influence.

THOMAS J. ABERCROMBIE, NATIONAL GEOGRAPHIC STAFF

All that remains of the ancient Persian empire are ruins at Persepolis where powerful kings built their capital. Sun-baked stone columns, once supports for a royal audience hall, blend with the seared rocky hills behind. Ancient Persia's roads and waterworks have crumbled.

Today Iran builds a new empire. Tall smokestacks of Abādān refineries and the flaming jets of the Aghā Jārī oil fields (left) are its symbols. Abādān is the industry's heart, where the biggest (and only complete) oil refinery in the Middle East can convert more than 400,000 barrels of crude oil daily into 102 types and grades of petroleum products. Iran's oil reservoirs along the Persian Gulf are so brimming it takes skill to drill a dry hole. Texans get excited over a 500-barrel-a-day strike in their oily state. Wells at Aghā Jārī pour out 25,000 to 30,000 barrels a day. These and others have turned Iran into the sixth largest oil-producing country in the world today.

Except on a rain-washed narrow strip of fertile lowland along the Caspian Sea, Iran depends for life on another underground resource: water. Rain is scarce, and only where irrigation canals

thread the dusty plains can vital fields of wheat, barley, rice, cotton, sugar beets, tea, fruit, and tobacco thrive.

An ancient *kanat* system—long underground conduits fed by deep wells—brings water to the 15 percent of the country where these crops grow.

Few farmers own their land. Most rent from urban landlords who may own whole villages. Some farmers pay their landlord as much as four-fifths of their harvest in return for their land, seeds, water, and equipment.

Seminomadic tribesmen—Kashgai, Lur, Kurd, Bakhtiari, and others—make up an estimated sixth of Iran's people. Since time immemorial, the Kashgai, with their sheep and goats, have wandered in spring from the southern plains to the green highland pastures, then back again as the first leaves fall from the trees.

Iran's monarch, Mohammad Reza Shah Pahlavi, has one foot in old Persia and the other in a modern nation. In sash, epaulettes, and gold-braided uniform, he receives foreign dignitaries at a 19th-century Tehrān palace. "In the great Salaam Hall, arches faced with mosaics of tiny mirrors shatter the light of crystal chandeliers and shower it extravagantly over the famous Peacock Throne, ablaze with 20,000 jewels," writes Mr. Linehan. "Priceless porcelains and marble, gifts to Persia's monarchs from Napoleon, Tsar Nicholas, and Queen Victoria, line the walls." Again, the Shah may be "a blue-suited businessman, brow furrowed over taxes and inflation, the price of oil, and land reform" (left).

The Shah must wrestle with such problems in his struggle to bring a new way of life to his old country. His reward is slow but sure progress.

Agricultural schools grow, and modern farm machinery makes a few small inroads. At a gorge of the Dez River in southwest Iran, men are building the Middle East's highest dam. An underground power plant will send power to villages which have never known electric lights. This is just one dam in an oil-financed, TVA-like scheme that envisions a system of 14 dams over five rivers to irrigate some 4,000 square miles.

New roads slice through the nation. In Tehrān, (right), late model automobiles negotiate busy streets. L.B.

Great Religions of the World No. 3

ISLAM

Allahu Akbar—Allahu Akbar. "God is Greatest—God is Greatest."

Five times a day this cry sweeps across half the world, from Morocco in North Africa to Mindanao in the Philippines. Men in Id Gah, Kashmir (below), rice harvesters in Indonesia, and rug-makers in Iran bow low in prayer, facing Mecca, the holy city.

They are Moslems, united in a religious faith they call Islam. With some 429,000,000 followers, it is the second (to Christianity) largest in the world today.

BRIAN BRAKE, MAGNUM

The Moslems' creed is *la ilaha illa'llah: muhammad rasulu' llah*—"There is no god but God, and Mohammed is His Prophet." Their Bible is the Koran. Their churches are mosques. The one on the cover tops a religious college in Eşfahān, Iran. Their church bell is a muezzin who cries *Allahu Akbar* from the tall, slender minaret of a mosque to summon the faithful to prayer.

Of the world's great religions, Islam is youngest. Its prophet, Mohammed, was born about 570 in Mecca (in what is now Saudi Arabia), a prosperous trade city. It was also a religious center. Pagan Arab tribes made pilgrimages to visit its shrines, including the Kaaba (lower right), a cubical stone building containing idols.

Mohammed lived as a shepherd and a trader until he was about 40. Although he was probably unable to read and write, his thoughts often transcended his workaday world and dwelled on religious questions. He had come in contact with Christians and Jews and endorsed their belief in one God. Often he wandered into the desert hills near Mecca to meditate.

One night as he rested in a cave, he had a vision. The archangel Gabriel appeared to him and commanded: "Recite!" He was inspired to utter the first sentences of what would become the Koran.

From this vision and the revelations that followed for a decade, Mohammed constructed a faith. It is called Islam: "complete submission to the will of God." A follower of Islam is a Moslem: "one who submits." Neither Mohammed nor his followers believed Mohammed a god. He is considered a prophet in a long line of prophets—including Abraham, Moses, and Jesus—through whom God has chosen to speak.

Mohammed denounced the idols that his pagan

countrymen worshiped. Outraged Meccan merchants threatened to kill him, for these idols brought the pilgrim trade to the city. Finally, in 622, the Prophet fled to Yathrib (now Medina). This year of the flight—the Hegira—is year 1 of the Moslem calendar.

In Medina Mohammed won support and, in 630, he returned triumphant to Mecca where he destroyed the idols in the Kaaba, leaving only the black basalt building to be a shrine for his followers.

© NGS

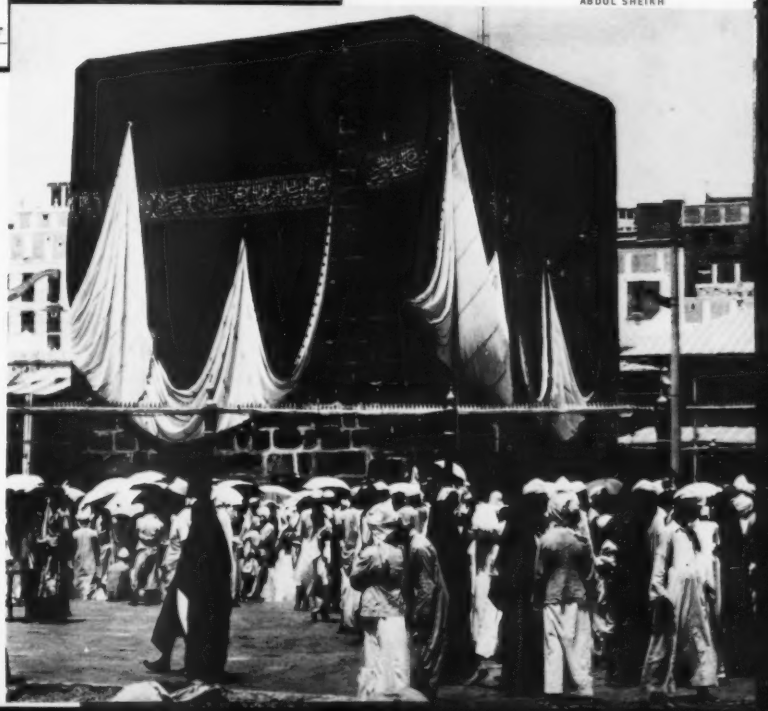
The new faith gave five commands: proclamation of the oneness of God; prayer five times a day; giving to the poor one-fortieth of one's wealth; fasting during the day throughout the month of Ramadan; pilgrimage to Mecca at least once in one's lifetime.

The Koran, memorized by a group of secretaries as Mohammed recited it, explains man's duties to men and to God. It prescribes the believer's daily diet. It sets standards of personal cleanliness and hospitality, regulates marriage and divorce, governs inheritance and the income tax.

The year after Mohammed's death in 632, the armies of Islam fanned out of the Arabian peninsula. Within a century Moslem rule extended west to the Atlantic and across the Strait of Gibraltar into Spain, Portugal, and France, and eastward to India. The Golden Age of Moslem culture came in the 9th, 10th, and 11th centuries. Art, philosophy, poetry, mathematics, geography, and medicine flourished while the message of Mohammed spread.

National boundaries have since dismembered this empire. Economic woes have weakened it. Yet, united by faith, it remains politically strong.

L.B.



Garbing the holy of holies— Pilgrims watch a new gold-embroidered mantle for the Kaaba drop into place during the annual *hadj* or pilgrimage to Mecca. Moslems believe the prophet Abraham built the Kaaba at the command of God.

ABDUL SHEIKH

UMI

Highway to the Amazon

MEN ARE TAKING the measure of Brazil's lonely interior. Only last year Brazil's government officially moved from coastal Rio de Janeiro to the heart of the central plateau and the magnificent new capital city of Brasília (*School Bulletins*, May 2, 1960).

Now a highway to the north has pushed the frontier 1,300 miles farther back and has given Brazil's populous south its first land link with the Amazon Basin.

An adventuresome motorist, who has good springs in his car and doesn't mind ferrying a couple of rivers on rough rafts, now can drive the entire Trans-Brazilian Highway, 2,567 miles from the Uruguay border to Belém, at the Amazon Delta. Or, more likely, he can start at Rio or São Paulo, follow good roads inland to Belo Horizonte, and motor over another new highway to Brasília, and thence on to Belém (see map).

Like the first transcontinental railroad across the United States, Brazil's new highway is expected to open a largely untapped interior. Sparsely populated, these central tablelands are reputedly rich in manganese, monazite (source of thorium), gold, oil, tungsten, iron, and coal. Although far from fertile, the soil lends itself to cattle raising.

The road has already benefited rice farmers on the southern edge of the Amazon jungle. When they had to haul their harvest by mule to market, the trip took 20 days. Now it goes by truck in 20 hours.

Traversing the Brasília-Belém highway from south to north, the motorist speeds toward Goiânia on pavement (left). Soon the road surface changes to *picarra* (a combination of sand, clay, and pebbles) and the route descends into the valley of the Tocantins River, following the tossing current to the tip of Goiás State. Here the engineers reluctantly left the river and drove into the Amazon rain forest for the final 300-mile lap to the delta.

As he guides his auto along a red gash

in a green wilderness, the motorist will discover why it took fully six years to complete the highway. So close-knit is the jungle wall that the construction men were the first white men to penetrate much of it.

They were led by a courageous road builder, Dr. Bernardo Sayão Carvalho de Araújo. Dr. Sayão not only envisioned the highway, he gave his life for it. While inspecting the site one day he was felled by a giant tree, and died on the way to a hospital. The highway is named for him.

His crews carried on. Tough-muscled men climbed into helicopters to drop into the wilderness miles ahead. With machetes, axes, and handsaws, they hacked their way through tangled underbrush, felled trees measuring 20 feet in diameter.

Modern road machinery from the United States did the rest. Phalanxes of crawler tractors and motor scrapers were followed by platoons of graders, right, to level the roadway.

By noon each day the heat was overpowering, and work ceased. It resumed later in the afternoon, the workers fortified by a lunch of black beans, rice, salted meat, and coffee, plus a siesta. Sometimes tractor-riding gauchos would churn out again at night to continue the work under lights.

The three-month rainy season brought new woes. It not only halted construction, but grounded the vital supply planes. The 3,000-man work force was supplied by light planes that either landed on fields carved out of the jungle or parachuted provisions. Once, when rain cut off supplies for five days, 16 men survived by rationing the monkeys they caught—one animal for two men per day.

Another potential threat—unfriendly Indians—never materialized. Jungle diplomacy prevented trouble. Each contractor hired several Indian workers as ambassadors to deal with hostile tribesmen.

On one occasion a surveying party was halted by a liana barrier across the path. The Indian envoy with them warned that to cut the vines and proceed would be to declare war on the local tribe. Better to leave gifts and withdraw. Next day, when the surveyors returned, both gifts and lianas were gone, and work continued. A.P.M.

INTERNATIONAL HARVESTER EXPORT COMPANY

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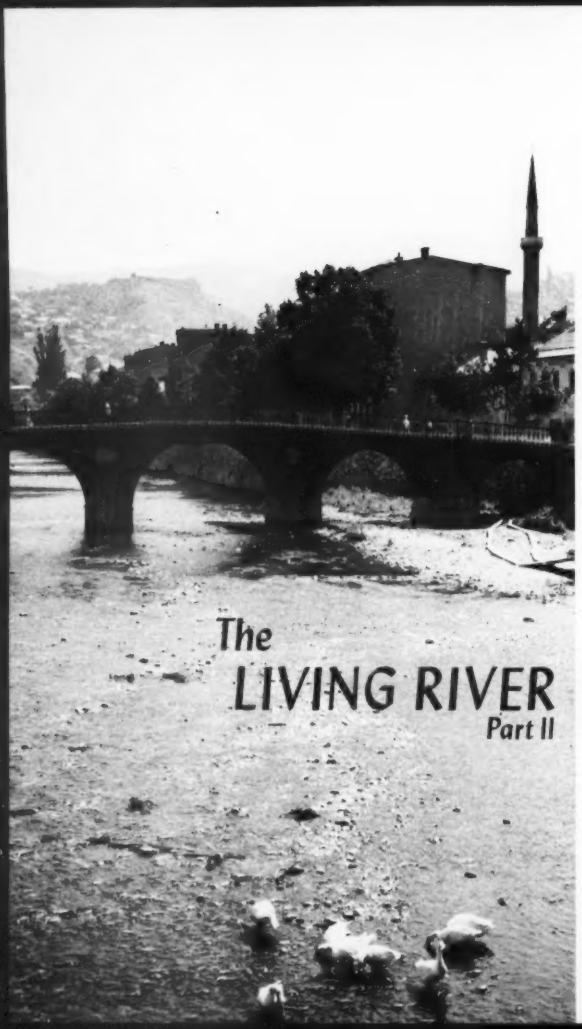


The LIVING RIVER

Part II

YUGOSLAVIA'S Miljacka River flows gently under the bridge; ducks dabble in its shallows. The scene is quiet; nothing suggests that here a great war started and another war is going on.

On this bridge a spark of hell-fire flew into an earthly powder keg in 1914 when an assassin shot the Crown Prince of Austria, igniting World War I.

Beneath the bridge when the shot was fired, another, age-old, war was continuing. Europe's struggle is over, but the river's goes on.

This is the battle for life itself, waged unendingly in the rivers of the world.

Since all life depends on water—from the tiniest microbe to the largest whale—rivers hold great concentrations of living things.

They all fight for light, food, or escape

Animals wage an unending struggle under, on, and above the surface

from enemies. The battle goes on at three levels: under water, on the water's surface, and above water.

Under water live most of the animals that we think of offhand as river species.

The river brings them plentiful supplies of water, oxygen, and food, but it also threatens to flush them into the sea. Without constant exertion—either swimming against the current or clinging to rocks—underwater animals would be swept away.

To help withstand the water's force, fish become streamlined; insect larvae and other forms of life develop strong grasping hooks.

To fight for life, underwater forms develop different body shapes. The trout, tiger of the streams, as clean-lined as a knife, flashes through the water with a flip of its powerful tail. Insects, minnows, salamanders, almost anything small enough to swallow is fair game.

Among smaller animals there are many as ferocious as the trout—some, such as the water scorpion, an insect, eat baby trout as well as smaller insects.

Some of the combatants are armored like tanks, for example, the crayfish. Some, like the caddis fly, build little cases of pebbles and bits of debris to hide in. Others have no protection at all, neither speed, weapons, nor shells, but survive by the simple means of breeding millions of young.

The mayfly is a favorite food of larger organisms. It perishes by regiments both as an underwater larva and as a mature, winged flyer. But enough survive to keep the species going.

FENNO JACOBS, BLACK STAR

At the river's surface, water molecules are bound together more tightly than those beneath, forming a layer of water denser than the rest. This thin film supports a surprising variety of beasts that stay dry as they walk, eat, fight, and reproduce on the water.

Best known is the water strider, with a leg span about the size of a half dollar. With six feet widespread for maximum support it stands on its fore and hind legs, while the middle pair push it ahead like oars. Skimming quickly along, the water strider searches for food from below and above. Mites and other insects emerging from the water, ants and beetles falling in from overhead branches, perhaps a dead minnow floating to the surface, provide its food.

TREAT DAVIDSON

The whirligig, a black, round beetle, spins in looping circles on the surface—keeping watch with two sets of eyes. On either side of its head are two eyes, divided by the waterline. One watches the water below, the other the air above.

Many insects lead divided lives, part in the water, part above it. Damsel fly larvae, for example, form under the surface, and are snapped up by larger fish. Those that survive to shed their pupal armor and emerge as iridescent, winged beauties, are still fair game for a trout (left).

The trout itself, though rarely, may fall victim to a fish hawk. Usually these birds pick on slower fish, such as the catfish.

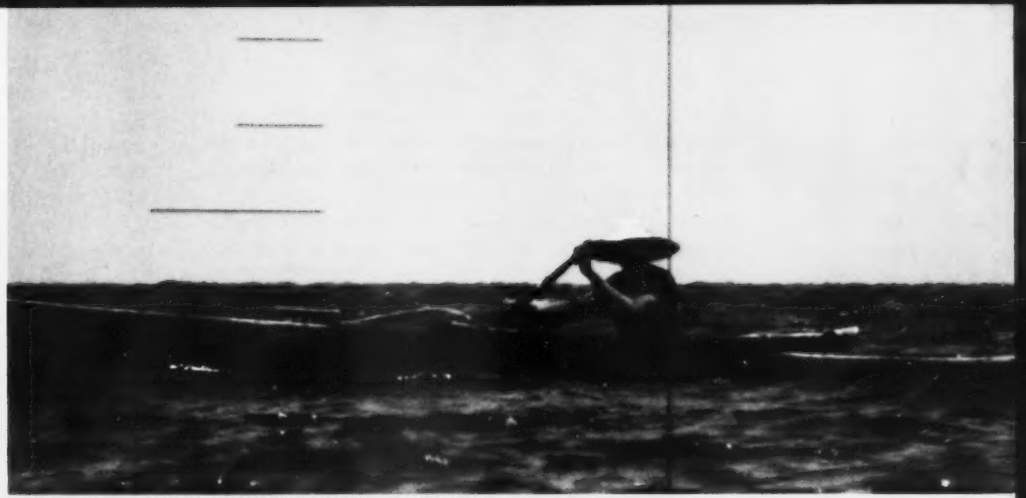
The eagle, an indifferent fisherman, may get along on fish already dead, or he may turn pirate, swooping upon a successful fish hawk and scaring it into dropping its supper. The eagle then grabs the meal and carries it off to its nest (above).

FREDERICK KENT TRUSLOW

Before man entered the picture the eagle had few effective enemies. Eventually, even it dies, however, perhaps from old age or parasites. Its magnificent body, fallen or washed into the stream, becomes easy meals for lesser creatures, and slowly gives up its chemical elements to be used by other members of the cycle of the living river. F.S.

UMI

Atomic Sub Meets Canoe In a Philippine Bay



JOSEPH BAYLOR ROBERTS, NATIONAL GEOGRAPHIC STAFF. BELOW, EDSON H. CANOVA

ON ITS SUPERSECRET submerged voyage around the world, the United States submarine *Triton* remained undetected—except by one man. When Capt. Edward L. Beach raised periscope in Magellan Bay, the Philippines (above), he found himself eye to eye with a boatsman (upper right). "It is a ludicrous situation," wrote Capt. Beach in the *National Geographic*. "On the one hand an impassive Asian, staring at an unusual object in the water; on the other hand, a U. S. Navy officer, equipped with all the devices money and science can procure, looking back."

Who was the man? The *Geographic* determined to find out. A member of the Society living in the Philippines tracked him down, cabled triumphantly, "Have found needle in haystack." Nineteen-year-old Rufino Baring (left) had decided the periscope was part of a sea monster. He concealed the incident from his family and painted saints' names on his canoe. He was relieved to learn the "monster's" nature.

UMI